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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,519	01/27/2004	Wensheng Wang	020394A	9969
23850	7590	10/15/2004	EXAMINER	
ARMSTRONG, KRATZ, QUINTOS, HANSON & BROOKS, LLP 1725 K STREET, NW SUITE 1000 WASHINGTON, DC 20006			TRAN, LONG K	
			ART UNIT	PAPER NUMBER
			2818	

DATE MAILED: 10/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/764,519

Applicant(s)

WANG ET AL.

Examiner

Long K. Tran

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13 - 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13, 15 - 17 and 19 is/are rejected.
- 7) ☒ Claim(s) 14, 16 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 10/115,208.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 01/27/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Response to Preliminary Amendment

1. This office action is in response to Preliminary Amendment filed on January 27, 2004.
2. Claims **1 – 12** and **20 – 31** have been cancelled.
3. Claims **13 – 19** are presented for examination.

Information Disclosure Statement

4. This office acknowledges of the following items from the Applicant:
Information Disclosure Statement (IDS) filed on January 27, 2004.
The references cited on the PTO -1449 form have been considered.

Claim Objections

5. Claim 14 is objected to because of the following informalities:
Claim 14: Change "a metal oxide" to -- the metal oxide --;
Claim 16: Change "the first metal oxide" to -- a first metal oxide --
Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claim 13 is rejected under 35 U.S.C. 102(e) as being anticipated by Yokoyama et al. (US Patent No. 6,313,539).

Regarding claim 13, Figure 21C illustrates a manufacturing method of a capacitor comprising the steps of:

forming a first conductive layer containing TaSiN layer 516 on an insulating layer 514,

forming a second conductive layer 518 made of IrO₂ on the first conductive layer;

forming a third conductive layer 519 made of platinum on the second conductive layer;

forming a dielectric layer 520 on the third conductive layer,

forming a fourth conductive layer 521 on the dielectric layer;

patterning the fourth conductive layer to form a capacitor upper electrode;

and

patterning the dielectric layer to form a capacitor dielectric layer (column 24, lines 44 – 49).

Yokoyama does not explicitly show patterning the first conductive layer, the second conductive layer, and the third conductive layer to form a capacitor lower electrode. However, It is conventional and well known in the semiconductor art that in order to provide a multi-layer electrode as taught by Yokohama, patterning a multi-layer

stack have to be performed. Therefore a step of patterning has to be performed to make the multi-layer lower electrode of Yokoyama device.

Regarding claim **15**, Figure 21C illustrates forming an interface conductive layer 517 made of the second metal (Ir) between the first conductive layer 516 and the second conductive layer 518 (col. 25, line 42).

Regarding claim **16**, Figure 21C illustrates forming a first metal layer 516 than a first metal oxide layer 518 sequentially.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim **17** is rejected under 35 U.S.C. 103(a) as being unpatentable over Yokoyama et al. (US Patent No. 6,313,539) in view of Koo (US Patent No. 6,376,325).

Regarding claim **17**, Yokoyama discloses the claimed inventions of claims 13 and 16 except for the first metal layer is an iridium layer, and the first metal oxide is iridium oxide.

Koo shows forming the lower electrode comprising an iridium layer 118a (fig. 3A); an iridium oxide 122 (fig. 3B). See column 5, lines 43+ and column 6, lines 1 – 23.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the first metal layer and the first metal oxide of

Yokoyama with the iridium as the first metal layer and the first iridium oxide as the first metal oxide of Koo, in order to improve ferroelectric characteristics and provide a reliable contact resistance of a barrier metal layer.

Yokoyama and Koo also fail to show the iridium oxide is formed by adjusting an oxygen gas and inert gas in a growth atmosphere to attain IrO_x ($0 < x < 1.2$). However, it would have been well known in the art that the selection of those parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.,** would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc., or in combination of the parameters** would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Moreover, "the iridium oxide is formed by adjusting an oxygen gas and inert gas in a growth atmosphere to attain IrO_x ($0 < x < 1.2$)" has not been alleged by applicant to be of significant importance for patentability.

10. Claim **19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Yokoyama et al. (US Patent No. 6,313,539).

Regarding claim **19**, Yokoyama discloses the claimed inventions of claim 13 except for in the step of forming the third conductive layer, the third conductive layer made of platinum is formed at a temperature of less than 400°C . However, it would have been well known in the art that the selection of those parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc., or in combination of the parameters** would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA

1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Moreover, "in the step of forming the third conductive layer, the third conductive layer made of platinum is formed at a temperature of less than 400⁰ C" has not been alleged by applicant to be of significant importance for patentability.

Allowable Subject Matter

11. Claims **14** and **18** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is an examiner's statement of reasons for the indication of allowable subject matter: Claims **14** and **18** are allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

a metal oxide 22 (fig. 3C) of the second metal is a metal oxide of a platinum group as cited in claims 14 and 18

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Tran *LK*
September 29, 2004


David Nelms
Supervisory Patent Examiner
Technology Center 2800